* NOTICES *

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PRIOR ART

[Description of the Prior Art] Conventionally, about CDMA communication system, the following reference exists, for example.
[0003] Reference 1: "Mobile Station-Base. Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System, TIA/EIA/IS-95, July 1993, U.S.A., "reference 2;"CDMA:Principles of Spread Spectrum Communication, and Addison Wesley and 1995." -- reference 3:"NTT DoCoMo Technical journal Vol.1 No.2 pp.21-29" -- here, reference 1 has described the radio interface of the mobile station and base station in CDMA communication system Reference 2 has described the example of arrangement of the base station in the CDMA communication system of reference 1. Reference 3 has described the arrangement and sector-izing of a base station in the PDC (Personal Digital Cellular) method which is the present digital cellular telephone.
[0004] With the conventional CDMA communication system which performs transmitted power control in order to aim at reduction of communication interference with other users, soft hand over is carried out, by using cell diversity, reduction of transmitted power is enabled and increase in the connectable number of mobile stations and improvement in system efficiency are aimed at per one base station.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention can be applied to the base station equipment in mobile communication system, such as personal communication system (it is called "PCS" Personal Communication Services and the following.) and digital cellular system, concerning the base station equipment in code-division-multiple-access (it being called "CDMA" Code Division Multiple Access and the following.) communication system.
[0002]
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[0005]
[Problem(s) to be Solved by the Invention] However, in the CDMA communication device in the standard method and operation form concerning reference 1 or reference 2, the indirectional thing is used as an antenna of each base station, and it has composition which sends out the signal after a carrier modulation as a radio sending signal through these antennas.
[0006] For this reason, in the going-up link from a certain mobile station to a certain base station, the sending signal from other mobile stations interfered mutually, and suited, communication quality was degraded and there was a problem that the number of the connection mobile stations per base station decreased.
[0007] Then, the Time Division Multiple Access concerning reference 3 (Time Division Multiple Access) it is called "TDMA" below the technology about a PDC method digital cellular telephone using a method -- that is If the technique to which the number of the mobile stations which divide one cell into two or more sectors, raise the reuse efficiency of frequency, and are connected concurrently to a base station is made to increase is applicable to CDMA communication system, although it will be thought that it ** to an above-mentioned problem solving The concrete system configuration or the control method for applying this technology to CDMA communication system are not yet shown.

[0008]
[Means for Solving the Problem]
(A) In order to solve this technical problem, in the 1st invention, between at least two or more sectors in a jurisdiction cell, it is 1 or two or more mobile station equipments, and base station equipment that communicates the user data by which used the code-division-multiple-access communication mode, and diffusion coding was carried out, and has the following meanses within at least one or more sectors.
[0009] Namely, (1) The access signal sent out from the mobile station equipment which had the response in the demand of a call at the time of a call setup or it required call origination Two or more correlation detection meanses which receive separately by the receiving means prepared about each of each sector, and carry out correlation detection of each of each input signal, and (2) By measuring the detection output in two or more correlation detection meanses, respectively It has the selection means for switching which choose the sector suitable for communication with mobile station equipment.
[0010] (B) Moreover, in the 2nd invention, between at least two or more sectors in a jurisdiction cell, it is 1 or two or more mobile station equipments, and base station equipment that communicates the user data by which used the code-division-multiple-access communication mode, and diffusion coding was carried out, and has the following meanses within at least one or more sectors.
[0011] Namely, (1) From the receiving status information notified from the mobile station equipment under communication When the fall of the receiving state by the side of the mobile station equipment concerned is detected, the sending-out signal transmitted from mobile station equipment Two or more correlation detection meanses which receive separately by the receiving means prepared about each of each sector, and carry out correlation detection of each of each input signal, and (2) By measuring the detection output in two or more correlation detection meanses, respectively The sector suitable for communication with mobile station equipment is chosen, and it has the selection means for switching chosen as the newly chosen sector concerned and a sector used for communication until a receiving state with henceforth [both sides / of the sector already used for communication / good] is recovered.
[0012] In addition, it is desirable to use the information about the ratio of the traffic channel received power to pilot-signal received power for receiving status information.
[0013] (C) Further, in the 3rd invention, between at least two or more sectors in a jurisdiction cell, it is 1 or two or more mobile station equipments, and base station equipment that communicates the user data by which used the code-division-multiple-access communication mode, and diffusion coding was carried out, and has the following meanses within at least one or more sectors.
[0014] That is, about the sector in a jurisdiction cell, it is not based on the difference in a sector, but has the diffusion modulation means which carries out diffusion coding of the user data with the same diffusion sign.
[0015]
[Embodiments of the Invention] The operation form of the CDMA communication system which uses the base station equipment concerning this invention hereafter is explained referring to a drawing.
[0016] (A) The whole CDMA communication system block diagram 1 is a conceptual diagram showing the basic topology of the CDMA communication system concerning an operation form.
[0017] In the case of drawing 1, CDMA communication system is constituted by four sets of three sets of one set (it is called "MCC" Mobile Communication Control Center and the following.) of the mobile communications control station 102 connected to the communication network 101, and the base stations 103-105 connected and held in this through a cable way, and the mobile stations 106-109 which communicate between either at least among these base stations.
[0018] Here, the ranges 110-112 of each base stations 103-105 (namely, cell) which can be communicated are surrounded and shown by the wavy line, and the sub cell fields (namely, sector) 116-118 are divided and shown by the long chain line.
[0019] In addition, ** The directional-antenna equipments 113-115 corresponding to each of each sector are formed in base stations 103-105.
[0020] Next, the topology between each equipment is explained.
[0021] The suitable transmission-line interface specified as MCC102 and the communication network

101 by the Synchronous Digital hierarchy (it is called "SDH" Synchronous Digital Hierarchy and the following.) connects. In addition, even if transmission / exchange form of a communication network 101 and MCC102 is an Asynchronous Transfer Mode (it is called "ATM" Asynchronous Transfer Mode and the following.), it may be a synchronous transfer mode (it is called "STM" Synchronous Transfer Mode and the following.).

[0022] Base stations 103-105 and MCC102 are connected with the suitable transmission-line interface specified by SDH. In addition, although ATM or STM is sufficient as transmission / exchange form of a between [MCC102 and each base station], when connecting by ATM, an ATM-STM inverter is needed for the going-down interface in each base station, and an STM-ATM inverter is needed for an uphill interface.

[0023] A connection place changes according to physical relationship with respectively relative each mobile stations 106-109 and each base stations 103-105, and communication is made between the offices where the radio channel was set up. For example, in the case of drawing 1 , the mobile station 106 is communicating with the base station 103, and the mobile station 107 is communicating simultaneously with a base station 103 and a base station 104. Moreover, as for a mobile station 108, which base station is not communicating. Furthermore, the mobile station 109 is communicating simultaneously through a base station 103 and two directional-antenna equipments 114 and 115.

[0024] In addition, these mobile stations 106-109 communicate between the base stations where the best receiving state is acquired among the input signals which all received through the radio propagation path.

[0025] Therefore, a mobile station switches the base station which sets up a radio-transmission way with movement in other cells [cell / one]. Thus, it is called hand over that a mobile station communicates with two or more base stations at the time of this change. Especially, the change between base stations (hand over) is called base station hand over. In the case of drawing 1 , the state of a mobile station 107 is in charge of base station hand over. Thus, when a mobile station communicates simultaneously with two or more base stations, the cell diversity effect is acquired, transmitted power is reduced, and it becomes possible to suppress interference given to an other station.

[0026] Similarly, a mobile station switches the directional-antenna equipment which sets up a radio-transmission way with movement into other sectors [sector / in the same cell / one]. Thus, the change produced when a mobile station crosses two or more sectors in the same cell is called sector hand over. In the case of drawing 1 , the state of a mobile station 109 is sector hand over. Thus, in sector hand over, it gets down, the effect of the cell diversity as base station hand over with the same link is acquired, and, as for an uphill link, the effect of the diversity between sectors, i.e., antenna diversity, is acquired. the terminal which has connected all mobile stations to a communication network 101 through at least one or more base stations and MCC102 -- or it communicates with the mobile station which turns up in MCC102 and belongs to a system again through at least one or more base stations

[0027] (B) Cell arrangement and its sector plot plan 2 of each base station are drawing showing the base station of the CDMA communication system concerning the operation form shown in drawing 1 , and the example of arrangement of a sector. Therefore, drawing 2 has shown each of all the base stations 103-105 as a thing equipped with three directional-antenna equipments 113-115. Although a base station equipped with one nondirectional-antenna equipment may also be arranged in fact, this invention does not eliminate such a base station. Here, although only the base station which has directional-antenna equipment is explained, when applying as communication system with which nondirectional-antenna equipment is intermingled, neither the problem on communication system or base station arrangement nor conflict is produced.

[0028] It returns to explanation of drawing 2 . In drawing 2 , a base station is arranged so that a cell may become right hexagon-like, and it is arranged so that the position of the boundary point whose orientation of the directional-antenna equipment of one of three sectors is 3 sectors may be turned to. The boundary line of a sector is expressed by the long chain line. It learns from drawing 1 also here, and a mobile station 107 is in the communication state of base station hand over between a base station 104 and 2 of a base station 103 base stations, and a mobile station 109 is in the communication state of

sector hand over among 2 sectors of the sector antenna equipment 114 connected to the base station 103, and sector antenna equipment 115.
[0029] (C) The block diagram 3 of the composition (C-1) MCC of each part is a block diagram showing the internal configuration of MCC102 among the CDMA communication system concerning this operation gestalt. In addition, the connection relation is the same as drawing 1 . That is, MCC102 is connected with the communication network 101, the base station 103, and the base station 104. However, the connection with a base station 105 is omitted.
[0030] Here, MCC102 consists of channel separation equipment 201, a channel multiplexer 202, protocol conversion equipment 203, protocol conversion equipment 204, multicasting equipment 205, the hand exaggerated memory table 206, the routing equipments 207 and 208, clock generation equipment 209, the selection synthesizer unit 210, a channel multiplexer and the clock insertion equipments 211 and 212, channel separation equipment, and clock decollators 213 and 214.
[0031] This MCC102 is the receiving status information between each base station which was monitoring the relative physical relationship of each mobile station and a base station continuously, and was notified from the mobile station, or between each directional-antenna equipment (with each base station name (code) or an antenna device name (code)). The antenna equipment concerning the information which becomes in the group of the receiving state (the state of received power, and a receiving SN ratio and others is included), the base station which starts base station hand over based on the traffic of each base station, or sector hand over is determined.
[0032] Here, the function which turns up the phase contrast information for which the routing equipments 207 and 208 and multicasting equipment 205 were addressed and sent out to the base station equipment which newly plans a setup of a communication channel from the base station which has a communication channel actually is realized.
[0033] In addition, although multicasting equipment 205 functions also as a means which carries out the multiple address of the information to two or more base stations concerning the hand over concerned at the time of base station hand over, at the time of sector hand over, this multiple address function does not use it.
[0034] Similarly, the selection synthesizer unit 210 functions, when compounding alternatively the received data from the base station concerning base station hand over based on reliability information.
[0035] In addition, since the activity of other portions is the same as the activity of each equipment in the CDMA communication system used from the former fundamentally, explanation is omitted.
[0036] (C-2) The block diagram 4 of a base station is a block diagram showing the internal configuration of a base station 103 among the CDMA communication system concerning an operation gestalt. In addition, the composition is the same as that of a base station 103 also about base stations 104 and 105.
[0037] As shown in drawing 4 , a base station 103 consists of a clock decollator and channel separation equipment 301, a channel multiplexer and clock insertion equipment 302, clock synchronization equipment 304, frame-period generation equipment 307, pilot coding equipment 310, the diffusion modulator 313, the sector switching unit 318, a channel board 321, and a sector board 322.
[0038] Here, the channel board 321 is prepared only several setting communication line minutes per one base station, and consists of the protocol conversion equipments 303 and 305, frame structure equipment and the offset compensator 306, the frame cracking unit 308, channel coding equipment 309, channel decryption equipment 311, a diffusion modulator 312, and a rake receiving set 314.
[0039] Moreover, the sector board 322 is prepared only several sector minutes per one base station, and consists of the carrier modulator 315, the carrier demodulator 316, transmitting reception combination antenna equipment 317, a carrier demodulator 319, and reception only antenna equipment 320.
[0040] These two boards are the feature portions of this operation gestalt.
[0041] Here, the internal configuration of the sector switching unit 318 which is located between the channel board 321 and two boards, and switches connection between boards is explained. In addition, although other equipment portions are anew explained in the term of explanation of operation, fundamental operation is the same as the equipment which constitutes the CDMA communication

system used from the former.
[0042] First, the internal configuration of the diffusion modulator 312 which constitutes a channel board in drawing 5 is shown. The diffusion modulator 312 concerning this operation gestalt is one-line two-step composition which consists of a diffusion modulator 510 for channel discernment, and a diffusion modulator 530 for base station discernment.
[0043] That is, it consists of a component of the 1st step which performs 1st processing which carries out the multiplication of the 1st different (that is, not based on a sector as long as it belongs to the same base station) diffusion sign for every base station, and a component of the 2nd step which performs 2nd processing which carries out the multiplication of the 2nd different (every [namely,] channel) diffusion sign for every mobile station.
[0044] By this two-step composition, even if it is in the same sector in the same cell, a different modulating signal for every (every [namely,] channel) mobile station can be sent out. In addition, in this way, as compared with the case where another long code is assigned for every sector, saving of a code is possible for a sector in this operation gestalt, as long as it belongs in the communication range of the same base station (cell), even if it differs by using the same long code.
[0045] Incidentally, the diffusion modulator 510 for channel discernment which is the 2nd step of component consists of two, a multiplier 512 and the diffusion sign generation machine 511 for channel discernment, and, on the other hand, the diffusion modulator 530 for base station discernment which is the 1st step of component consists of a multiplier 532 and a diffusion modulator 531 for base station discernment.
[0046] Here, an exclusive-OR (it is called "XOR" eXclusive OR and the following.) circuit is used for multipliers 512 and 532.
[0047] Then, the composition of the rake receiving set 314 which constitutes the channel board 321 as well as drawing 6 is shown. The rake receiving set 314 turns into the finger equipments 601 and 602 from the synthetic vessel 603. Here, each finger equipments 601 and 602 carry out back-diffusion of gas of the input signal with the same diffusion sign to each carrying out back-diffusion of gas of the input signal with each diffusion sign corresponding to each diffusion sign currently assigned to each sector at the time of base station hand over at the time of sector hand over.
[0048] On the other hand, the sector switching unit 318 consists of composition shown in drawing 7. The sector switching unit 318 consists of a selection switching unit 701, maximum judging equipment 702, and matched filters 703-705.
[0049] The feature of the sector switching unit 318 concerning this operation form is the point of having judged that from which the highest output is obtained among the signals which prepare matched filters 703-705 about each of the antenna corresponding to each sector, and are acquired from each matched filters 703-705 with maximum judging equipment 702.
[0050] This judgment result is used for the change of the I/O path of the selection switching unit 701.
[0051] At the time of a call request / call response, especially the selection switching unit 701 operates so that only that by which the largest output was obtained from the mobile station among the recovery signals received by the antenna of each sector may be outputted to the channel board corresponding to the base station concerned.
[0052] Moreover, the selection switching unit 701 outputs a sending signal to the antenna of the sector determined from the previous judgment result at the time of a call request / call response.
[0053] In addition, the receiving status information (it mentions later) included in the signal by which the reception recovery was carried out through the antenna of the sector currently actually used for communication gets down, and this selection switching unit 701 is monitoring the value of traffic channel received power / pilot-signal received power Rtp continuously. When this value turns into below the threshold set up beforehand, the recovery signal from sectors other than the sector currently used for communication at present is also given to the rake receiving set 314 that sector hand over should be performed.
[0054] Moreover, the selection switching unit 701 outputs the actually same signal as the sending signal under communication in this case to the sector from which the largest received power besides the sector

currently actually used for communication was obtained.
[0055] Thus, the sector switching unit 318 makes selection of the sector used for communication with a mobile station, and the decision of a change.
[0056] (C-3) The block diagram 8 of a mobile station is a block diagram showing the internal configuration of a mobile station 107 among the CDMA communication system concerning an operation form. In addition, it consists of the composition same also about mobile stations 106, 108, and 109 as a mobile station 107.
[0057] As shown in drawing 8 , a mobile station 107 consists of antenna equipment 401, the carrier demodulator 402, the carrier modulator 403, the rake receiving set 404, the diffusion modulator 405, channel decryption equipment 406, the pilot extractor 407, channel coding equipment 408, the frame cracking unit 409, the frame phase measuring device 410, frame structure equipment 411, information source coding equipment (decoder) 412, offset calculation equipment 413, information source coding equipment (encoder) 414, and a receiving state measuring device 415.
[0058] Fundamentally also about the activity of these each part, it is the same as the activity of each equipment in the CDMA communication system used from the former.
[0059] However, the rake receiving set 404 is used for the synthetic recovery of the input signal received from two antenna equipments separately prepared for every two sector prepared in the same cell at the time of execution of the sector hand over which is operation peculiar to this operation form. In addition, the synthetic operation does not have the case and difference in base station hand over.
[0060] Moreover, in the receiving state measuring device 415, a mobile station 107 measures the receiving state (received power and getting down a signal power interference power ratio (it is called "SIR" Signal Interference Ratio and the following.), traffic channel received power / pilot-signal received power Rtp) about each input signal received from each sector (it contains when it belongs to the base station where each differs, and when it belongs to the same base station), and returns it to a base station side by making this into receiving status information.
[0061] A signal power interference power ratio (it is called "SIR" Signal Interference Ratio and the following.) and received power are information which is needed for base station hand over here, it gets down and traffic channel received power / pilot-signal received power Rtp is information which is needed for sector hand over.
[0062] (D) inside ** of the processing according to the sense of a link -- first, get down and explain each contents of processing about the case of a link and each going-up link
[0063] (D-1) getting down -- **** of the processing (D-1-1) MCC in a link -- it can set to MCC102 first -- get down and explain operation of a link
[0064] The communication network 101 of this system exterior superimposes the data of two or more connections between terminals by time multiplex, and sends them to MCC102. In MCC102, the data by which time multiplex is carried out are divided into each channel in channel separation equipment 201. In channel separation equipment 201 and protocol conversion equipment 203, termination of the protocol of the data link layer of an external communication network is carried out, and the protocol of the data link layer of this system is started.
[0065] The output data of protocol conversion equipment 203 are inputted into multicasting equipment 205. The communication data between the terminals inside this system are turned up with routing equipment 207, and are inputted into multicasting equipment 205 like the output data of protocol conversion equipment 203. Multicasting equipment 205 recognizes the connection who carries out base station hand over by searching the hand exaggerated memory table 206, and multicasts data to the corresponding connection. The cotton of each data is carried out to routing equipment 208 this back.
[0066] Routing equipment 208 distributes the data of the plurality in connection with base station hand over by which the base station HEMARUCHI cast was carried out. In multicasting equipment 205, multicasting is not carried out but the cotton of the data of the connection without regards to base station hand over is carried out to routing equipment 208 as it is.
[0067] It refers to the hand exaggerated memory table 206 at the time of sector hand over as well as base station hand over, and it is recognized by the system. this time -- MCC **** -- multicasting is not

performed but it is notified to a base station using the connection of the same control signal as a communication channel

[0068] One or more connections' data are inputted, and a channel multiplexer and the clock insertion equipments 211 and 212 carry out multiplex [of them], and are transmitted to base stations 103 and 104, respectively. At this time, a clock is inserted as a synchronizing signal. For example, it is 8 [kbits/s] when transmission speed is 1.544 [Mbits/s]. A clock is inserted.

[0069] (D-1-2) Explain operation of the going-down link in the processing base station 103 of a base station.

[0070] A clock decollator and channel separation equipment 301 set the clock inside a base station by clock synchronization equipment 304 with reference to the clock separated further while dividing into each channel the data multiplex sent from MCC102. A phase-synchronous-loop circuit (it is called a "PLL circuit" Phase-Locked Loop Circuit and the following.) is used for this.

[0071] By existence of a PLL circuit, as compared with the clock of MCC102, the phase lag by transmission will only exist, and the clock of a base station 103 will have the same clock, and becomes possible [calculating the same time].

[0072] The output data from a clock decollator and channel separation equipment 301 are inputted into the channel board 321. As for the data of other communications, the channel board 321 HE input of the others is carried out.

[0073] The next operation is performed with the channel board 321. First, the output data from a clock decollator and channel separation equipment 301 are given to protocol conversion equipment 303, and termination of the protocol of the transmission line between MCC and a base station is carried out in the equipment concerned. Next, these output data are given to frame structure equipment and the offset compensator 306, and are constituted by the frame which is the unit transmitted between non-railroad sections in the equipment concerned.

[0074] In channel coding equipment 309, error correcting code-ization of convolutional-code-izing, an interleave, etc. is performed, and the output data constituted by the frame are diffused to diffusion bandwidth by the diffusion modulator 312. For example, if symbol speed after error correction is set to 64 [ksymbols/s], this will be diffused to the signal of 5 [MHz] by being spread 64 times, the signal, i.e., the diffusion band, of 4.096 [Mchips/s].

[0075] In addition, in this diffusion modulator 312, as shown in drawing 5 , the double diffusion modulation of the diffusion modulation for channel discernment and the diffusion modulation for base station discernment is also carried out. Here, the diffusion sign for short code and base station discernment is called long code for the diffusion sign for channel discernment.

[0076] The signal interference from the base station which adjoins by diffusing data in long code among these two kinds of signs is pressed down, and a point-to-multipoint connection is made possible by being spread in short code. The code with a long code peculiar to a base station is allotted, and a short code is assigned whenever connection is set up.

[0077] At the time of sector hand over, a diffusion modulation is performed using a long code peculiar to the suitable base station for communication, and the short code assigned separately in each base station. The user signal by which diffusion was carried out [aforementioned] is inputted into the sector switching unit 318 with the user signal after other diffusion. The sector switching unit 318 switches the diffused user signal to the suitable sector board 322 for the communication to which it was directed by MCC102.

[0078] The selected sector board 322 modulates this user signal to a radio frequency band in the carrier modulator 315, and transmits it to a mobile station through transceiver combination antenna equipment 317.

[0079] On the other hand, the clock separated in a clock decollator and channel separation equipment 301 is inputted into frame-period generation equipment 307, and a frame period is calculated by count operation in the frame-period generation equipment 307 concerned. The calculated frame period is given to the sector board 322 in another system with a user signal through pilot coding equipment 310 and the diffusion modulator 313.

[0080] Here, pilot coding equipment 310 generates a pilot signal through coding suitable based on the frame period inputted. This is diffused to a diffusion band in the diffusion modulator 313. Thus, the diffused pilot signal is given to the sector board 322.
[0081] Now, the sector board 322 modulates the pilot signal diffused as mentioned above to a radio frequency band in the carrier modulator 315, and transmits it all over space as sector information through the antenna equipment 317 of transceiver combination with the user signal explained previously.
[0082] (D-1-3) Explain operation of the going-down link in a mobile station 107 at the last of explanation of the processing going-down link of a mobile station of operation. This operation is reception operation.
[0083] It restores to the diffusion signal received with antenna equipment 401 through the radio propagation path to the signal of a diffusion band by the carrier demodulator 402. Under the present circumstances, a mobile station 107 does not need to recognize whether the number of sectors transmitted from a base station 103 is 1 sector, or they are two or more sectors.
[0084] A diffusion band signal is further inputted into the rake receiving set 404, and back-diffusion of gas is carried out to the signal of a **-SUBANDO band. Here, the rake receiver 404 compounds the multi-pass produced by reflection of amendment of the phase rotation by phasing generated with movement of a mobile station, the building in a radio propagation path, etc., and has a means to improve receiving gain.
[0085] It states from the rake receiver 404, and after - SUBANDO signal passes through error correction processing of a day interleave, the Viterbi decode, etc. in channel decryption equipment 406, it removes symbols, such as a header, in a frame cracking unit, and takes out user data.
[0086] This user data is inputted into information source coding equipment (decoder) 412, and is changed into the state where a user can recognize. For example, it is G729 if it is voice. It changes into the sound signal which a user can recognize by decoding the data by which voice coding was carried out by 32 k-ADPCM etc.
[0087] (D-2) Explain processing in an uphill link, then processing operation of each station in an uphill link.
[0088] (D-2-1) **** of a mobile station -- explain operation of the going-up link in a mobile station 107 first This operation is a send action.
[0089] The information from a user is encoded by digital data in the information source coding (encoder) 414. In addition, when the direct input of the digital signal is carried out from a user side, this conversion operation is unnecessary.
[0090] Now, in frame structure equipment 411, the digitized information can be carved into the data unit suitable for transmitting to a radio propagation path, and is given to channel coding equipment 408. Channel coding equipment 408 performs error correcting code-ization of convolutional-code-izing, an interleave, etc. to this data, and diffuses it to diffusion bandwidth by the diffusion modulator 405 to it.
[0091] In the carrier modulator 403, even a radio frequency band becomes irregular, and diffusion band data are emitted into a radio propagation path through antenna equipment.
[0092] (D-2-2) Explain processing of a base station, next operation of the going-up link in a base station 103.
[0093] Each signal from two or more mobile stations received through the radio propagation path with transceiver combination antenna equipment 317 and reception only antenna equipment 320 is inputted into the carrier demodulators 316 and 319, respectively, and is changed into the signal of a diffusion band. The signal of this diffusion band is inputted into the channel board 321 through the sector switching unit 318.
[0094] In the channel board 321, the inputted signal of a diffusion band is inputted into the rake receiving set 314, amendment and multi-pass composition of phase rotation of phasing are united with back-diffusion of gas, and are carried out, and it gets over to the signal of a **-SUBANDO band.
[0095] In addition, in the above reception operation, when sector hand over is not carried out, transceiver combination antenna equipment 317 and reception only antenna equipment 320 are used in

the pair connected to the same sector, and are used for antenna diversity.
[0096] On the other hand, when [that] sector hand over is carried out, it is switched to the antenna connected to the sector from which either transceiver combination antenna equipment 317 or reception only antenna equipment 320 differs, and is used for sector diversity.
[0097] Here, channel decryption equipment 311 carries out error correction processing of a day interleave, the Viterbi decode, etc., and decomposes a radio frame by the frame cracking unit 308. Termination of the radio interface is carried out in this frame cracking unit 308.
[0098] The output data of the frame cracking unit 308 are changed into the transmission protocol between a base station and MCC by protocol conversion equipment 305. By the channel multiplexer and clock insertion equipment 302, multiplex is carried out to other channels, a clock is inserted, and the data by which protocol conversion was carried out are transmitted to MCC102.
[0099] (D-2-3) Explain operation of the going-up link in MCC102 at the last of explanation of the processing going-up link of MCC of operation.
[0100] The data multiplex transmitted from base stations 103 and 104 is inputted into a clock decollator and the channel separation equipments 213 and 214, respectively, and the clock contained in the data multiplex concerned is separated. A clock decollator and the channel separation equipments 213 and 214 take a synchronization, and separate the data by which multiplex is carried out from the taken-out clock.
[0101] The data on the separated channel pass along the selection synthesizer unit 210, and are inputted into routing equipment 207.
[0102] Here, the selection synthesizer unit 210 searches the connection in connection with base station hand over on the hand exaggerated memory table 206, carries out selection composition of received data per radio frame at the time of hand exaggerated operation of the corresponding connection, and acquires the cell diversity effect.
[0103] Moreover, routing equipment 207 judges the terminal which the terminal of a communications partner has connected to this system, and the terminal which must be connected through the external communication network 101, and if it is a terminal linked to this system, it will be turned up here and it will input it into multicasting equipment 205.
[0104] On the other hand, if it is the terminal which the terminal of a communications partner must connect through the external communication network 101, termination of the protocol of this system will be carried out with protocol conversion equipment 204, and it will change in accordance with the protocol of the external communication network 101 in a channel multiplexer 202.
[0105] The explanation about the data flow in this system was ended above.
[0106] (E) Each station which performs operation explained to the sector hand exaggerated operation last above explains how it operates as the whole system at the time of sector hand over.
[0107] (E-1) operation required for sector hand over -- here, explain the case where sector hand over is performed to the sector 118 which a mobile station 109 similarly connects to a base station 103 from the sector 117 linked to a base station 103
[0108] Now, in case sector hand over is carried out, operation which gets down and is required of a link is that the data currently transmitted by one line branch to two lines, a sector 117 and a sector 118, in a base station 103 from MCC102 to a base station 103.
[0109] On the other hand, operation demanded in an uphill link is the receiving state of a multi-pass choosing a suitable thing, and performing the maximum ratio composition in the rake receiving set 314 out of each signal received by two lines of sectors 117 and 118, after being transmitted from a mobile station 109.
[0110] (E-2) operation before sector hand exaggerated -- explain this using drawing 9 and drawing 10 However, the pilot signal shall be transmitted by transmitted power regularity by the signal peculiar to a base station, and the same code shall be assigned through all base stations as the short code. Moreover, in drawing 9 and drawing 10 , the short code of the above-mentioned pilot signal is expressed as SC#0, and the long code of a base station 103 is expressed as LC#0.
[0111] Furthermore, since one corresponding channel board is used for communication to one mobile station while carrying out sector hand over, as for the going-down channel and going-up channel in

drawing 9 and drawing 10 , the same channel board is used, respectively.
[0112] Drawing 9 shows the usual communication state before sector hand exaggerated operation.
[0113] As shown in drawing 9 , the base station 103 under transmission is transmitting to the mobile station 109 through the transmitting reception combination antenna equipment concerning a sector 117. At drawing 9 , the short code which gets down and is used by the channel is expressed by SC#N. These SC#N differs in SC#0 which is the short code of a pilot signal.
[0114] On the other hand, the base station 103 under reception receives the sending signal from a mobile station 109 by the antenna diversity reception which used transmitting reception combination antenna equipment and reception only antenna equipment. And by inputting into the synthetic vessel 603 the received wave which carried out back-diffusion of gas with the finger equipments 601 and 602 shown in drawing 6 , it compounds amending a part for the propagation delay, and outputs to the rake receiving set 314.
[0115] In addition, especially the positional information of a base station or a sector is not given to a mobile station 109 only by only the long code being notified beforehand. Moreover, the sector switching unit 318 of a base station 103 is making selection of the sector linked to a mobile station 109, and the decision of a sector change, and the mobile station 109 is not involving. That is, although a mobile station 109 recognizes the connected base station, with which sector in the base station it has connected does not recognize.
[0116] Here, the base station 103 has determined the sector how, or the procedure is shown.
[0117] The mobile station 109 has transmitted the uphill random access channel for a call request / call response to the base station 103.
[0118] At this time, a base station 103 observes and measures the received power of the uphill random access channel in each sector in matched filters 703-705, and chooses the sector of the maximum received power. And while getting down to the sector chosen with maximum judging equipment 702 using the selection switching unit 701 and transmitting the signal of a channel, the going-up signal from a mobile station 109 is received with the corresponding sector.
[0119] (E-3) Shift operation to sector hand over, next change operation of a sector are shown.
[0120] In the state in front of sector hand [which were shown in drawing 9] exaggerated, according to directions of a base station 103, a mobile station 109 is a fixed interval and has reported the ratio (getting down traffic channel received power / pilot-signal received power) Rtp of the going-down traffic channel received power to pilot-signal received power to the base station 103.
[0121] When the value of this power ratio Rtp deviates from the sector which the mobile station 109 has connected actually, it is a value which becomes low. It is because traffic channel received power will become small by this getting down although change is not accepted in the power since the pilot signal is transmitted with the power same from every sector from every base station if the sensitivity from the sector currently actually used for communication falls.
[0122] On the other hand, the base station 103 is supervising the power ratio Rtp of the selection switching-unit 701 smell lever of the sector switching unit 318, as mentioned above. And if having become below a threshold with this power ratio Rtp is observed, the received power will be observed about other two sectors, and the sector from which the maximum received power is obtained will be looked for.
[0123] And by change processing by the sector switching unit 318, also about the sector which observed the maximum received power, a base station 103 sends out the recovery signal received from the sector concerned to the rake receiving set 314 while transmitting the same signal as the signal transmitted with the already transmitted sector.
[0124] Thereby, a base station 103 adds the input signal about two or more sectors within the rake-receiving set 314, and performs the maximum ratio composition. Consequently, it will be in the state in sector hand [which were shown in drawing 10] exaggerated.
[0125] When it changed into the state in this sector hand exaggerated, and it supervises whether the base station 103 became more than a threshold (th sec del) with the power ratio Rtp reported from the mobile station 109 and an affirmation result is obtained, the received power in each connection sector is

observed.
[0126] And it gets down about the sector whose received power was the smallest, and goes up with transmission of a link, and reception of a link is stopped. Consequently, it will be in a communication state, i.e., the state after sector hand exaggerated, as shown in drawing 9 .
[0127] In addition, like [a mobile station 109] a power ratio Rtp, it gets down, and a base station 103 carries out the measurement report of the traffic channel received power, and notifies MCC102 of this information. At this time, MCC102 judges whether based on information with the report, i.e., the traffic situation of each base station, base station hand over is carried out on the hand exaggerated memory table 206 from a mobile station 109.
[0128] As mentioned above, according to this operation gestalt, also in CDMA communication system, a signal is not disrupted and sector hand over is realized.
[0129] (F) the effect of an operation gestalt -- according to this operation gestalt, also in CDMA communication system, sector-ization of a cell becomes actually possible, and the number of cocurrent connection of the mobile station per base station can be made to increase as mentioned above now
[0130] Moreover, in the change between the sectors between different base stations in the same base station, it becomes possible to carry out the soft hand over which does not make communication data cut in pieces, and good communication quality can be maintained.
[0131] Furthermore, since the broadcast with two or more sectors of a mobile station becomes possible, the diversity effect can be acquired, receiving gain is acquired in a base station and each mobile station, and the transmitted power of a base station and a mobile station can be pressed down low. Thereby, communication interference with a base station and other mobile stations can become low, and can make the number of cocurrent connection mobile stations per sector increase.
[0132] Furthermore, since priority is given to sector hand over over base station hand over and it was made to perform it, reduction of the transmission efficiency between MCC and a base station can be prevented.
[0133] Furthermore, the CDMA communication system concerning this operation gestalt is advantageous, when realizing a system, since it can be coped with only by the change by the side of a base station and is not accompanied by the change by the side of a mobile station.
[0134] (G) Although the case where one cell was divided into three sectors in the above-mentioned operation gestalt which are other operation gestalten was described, also in the case of two, also in the case of four or more, the number of partitions can be applied. In addition, what is necessary is to prepare the sector board prepared in a base station only several minutes of the sector concerned, as mentioned above.
[0135] Moreover, in an above-mentioned operation gestalt, although the case where an exclusive "or" circuit was used as a multiplier in the diffusion modulator 312 was described, you may apply the circuit which performs multiply operation under other rules.
[0136]
[Effect of the Invention] As mentioned above, the detection output about the access signal sent out from the mobile station equipment which had the response in the demand of a call or it required call origination at the time of a call setup according to the 1st invention each of each sector -- by having chosen the sector suitable for communication with mobile station equipment from eye ******** and these comparison result, even if the information about a sector that it was suitable for communication from the mobile station equipment side is not given, a suitable sector can be specified by the base station equipment side
[0137] Moreover, when the receiving state under communication and by the side of mobile station equipment falls according to the 2nd invention, It asks for the detection output about the sending-out signal transmitted from mobile station equipment about each of each sector, and the sector which was suitable for communication with mobile station equipment from these comparison result is chosen. The newly chosen sector concerned, By choosing as a sector used for communication, the soft hand over which interception of communication data does not fear is realizable until a receiving state with henceforth [both sides / of the sector already used for communication / good] is recovered.

[0138] In addition, if the information about the ratio of the traffic channel received power to pilot-signal received power is used for receiving status information, even if whether mobile station equipment is moving to which sector from which sector cannot recognize, about the execution timing of soft hand over, it can do with an execute permission certainly.
[0139] Furthermore, according to the 3rd invention, about the sector in a jurisdiction cell, the number of the diffusion signs used as compared with the ** case which attaches a separate diffusion sign about each of each sector can be saved by not being based on the difference in a sector but carrying out diffusion coding of the user data with the same diffusion sign.

[Translation done.]

* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Base station equipment which uses a code-division-multiple-access communication mode, and communicates with 1 or two or more mobile station equipments the user data by which diffusion coding was carried out within at least one or more sectors between at least two or more sectors in a jurisdiction cell characterized by providing the following. Two or more correlation detection meanses which receive separately the access signal sent out from the mobile station equipment which had the response in the demand of a call by the receiving means prepared about each of each sector at the time of a call setup or it required call origination, and carry out correlation detection of each of each input signal. Selection means for switching which choose the sector which was suitable for communication with the above-mentioned mobile station equipment by measuring the detection output in two or more above-mentioned correlation detection meanses, respectively.
[Claim 2] Base station equipment which uses a code-division-multiple-access communication mode, and communicates with 1 or two or more mobile station equipments the user data by which diffusion coding was carried out within at least one or more sectors between at least two or more sectors in a jurisdiction cell characterized by providing the following. Two or more correlation detection meanses which receive separately the sending-out signal transmitted from mobile station equipment by the receiving means prepared about each of each sector, and carry out correlation detection of each of each input signal from the receiving status information notified from the mobile station equipment under communication when the fall of the receiving state by the side of the mobile station equipment concerned is detected. By measuring the detection output in two or more above-mentioned correlation detection meanses, respectively, the sector suitable for communication with the above-mentioned mobile station equipment is chosen, and it is the newly chosen sector concerned. Selection means for switching chosen as a sector which uses the both sides of the sector already used for communication for communication until a receiving state with henceforth [good] is recovered.
[Claim 3] The above-mentioned receiving status information in a claim 2 is base station equipment characterized by being the information about the ratio of the traffic channel received power to pilot-signal received power.
[Claim 4] Base station equipment characterized by providing the following. It is 1 or two or more mobile station equipments within at least one or more sectors between at least two or more sectors in a jurisdiction cell. It is the diffusion modulation means which uses a code-division-multiple-access communication mode, it is base station equipment which communicates the user data by which diffusion coding was carried out, and is not based on the difference in a sector but carries out diffusion coding of the user data with the same diffusion sign about the sector in a jurisdiction cell.

[Translation done.]